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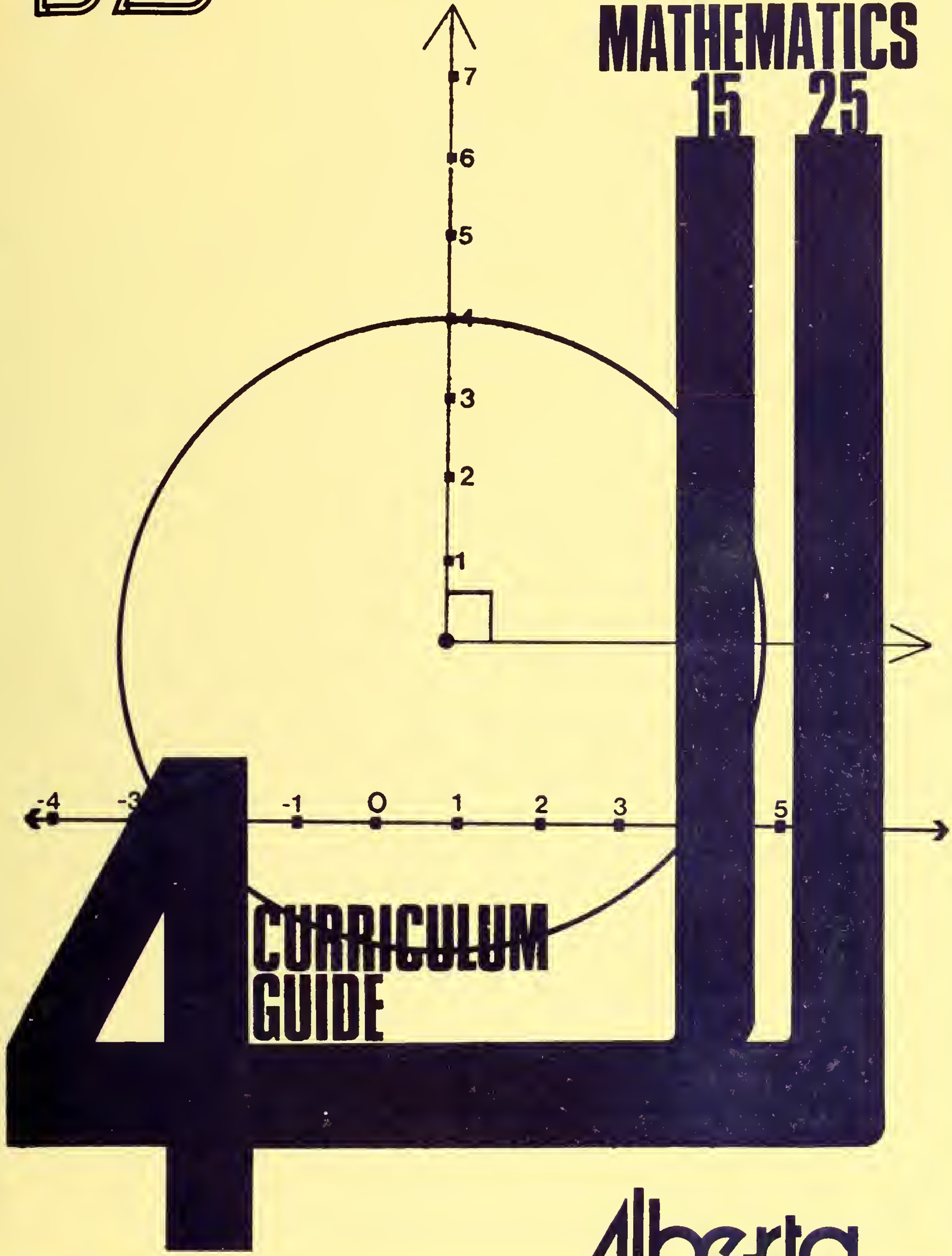
MATHEMATICS 15 25

CURRICULUM GUIDE



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ACKNOWLEDGEMENT

The Department of Education acknowledges with appreciation the contributions of the following members of the Senior High School Mathematics Ad Hoc Committee to the preparation of this Curriculum Guide for Mathematics 15 and Mathematics 25.

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NOTE:

This Curriculum Guide is a service publication only. The information is prescriptive only insofar as the content of the Guide duplicates that contained in the Program of Studies for Senior High Schools of Alberta. The Curriculum Guide contains, as well as content, methods of developing the concepts, suggestions for the use of teaching aids, and lists of additional reference material.

COVER DESIGN

The cover design is by Richard Wolfe, Graphic Arts student at Bishop Carroll High School in Calgary. Richard's teacher is Mr. L. Springer.

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INTRODUCTION

Ours is a consumer society. For all practical purposes, everyone is a consumer. As a consumer, a person is faced continually with making decisions about the purchase and use of goods and services. A major purpose of these courses is to help the consumer make sure that his decisions are right ones.

To make right decisions requires more than the desire to do so. One necessary condition, for example, is the ability first to recognize and then to analyze alternatives with a good measure of objectivity, so that a good many important factors are examined and compared. Another requirement is a ready facility with basic mathematical skills.

The main content of Mathematics 15 and Mathematics 25 is devoted to typical everyday consumer problems where mathematical skills often have useful application. Through exploration, discussion, application, and review, the student will develop a competency in solving consumer problems that will persist beyond the strict confines of the classroom into the affairs of his everyday life, both now and in his/her future.

Much of the success of this program will depend upon the teacher. It is hoped that the teacher will be an understanding person, concerned with the development of students who are experiencing difficulty in mathematics, and one who recognizes the problems involved in this area of teaching. For maximum success, the teacher must be willing to try new ideas, and to learn from his students as well as from his colleagues. He must be sensitive to the needs of the students.

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Objectives of Senior High School Mathematics Curriculum

While the three programs of this curriculum may have different specific objectives, the common general purposes of the Senior High School Mathematics curriculum may be stated as follows:

1. The Understanding of Mathematical Concepts

   To develop an understanding of the main unifying ideas that make up the structure of mathematics.

2. The Development of Mathematical Skills

   To develop and maintain those essential skills that support and augment mathematical concepts.

3. Problem Solving Ability

   To develop the ability to apply mathematical concepts and skills to the logical analysis and solution of problems.

4. Attention to Precision of Expression and to Modes of Reasoning

   To develop precision in the use of mathematical symbols as a language of communication and to consider the nature of proof as represented by various reasoning modes.

5. Appreciation of the World of Mathematics

   To develop an appreciation of the contribution of mathematics to the progress of civilization.

Specific Objectives of Mathematics 15 and Mathematics 25

1. To revitalize interest in mathematics through successful experiences at the student's level of understanding and through the use of novel approaches.

2. To extend the student's knowledge of mathematical operations and his ability to apply these.

3. To develop an understanding of the skills and knowledge necessary to cope with the problems of the consumer.

MATHEMATICS 15

Recommended Text:

Saake, T. F. & B. Conchie, Mathematics of Consumer Studies. Addison-Wesley, Don Mills, 1975.

Course Outline

The following topics should be considered as a suggested list only. Teachers should feel free to modify the program to suit the needs and interests of their students. Such modification may include the deletion and/or addition of some topics. In cases where students will follow the Mathematics 15, Mathematics 25 sequence, attention should be given to those topics of Mathematics 15 which are considered as desirable preparation for Mathematics 25. Not all topics listed are treated in the recommended text. Teachers should consult the Curriculum Guide for resource materials.

A. Numeration Systems

B. Basic Algebra
   1. Natural numbers, integers, fractions (common and decimal) and rational numbers.
   2. Ratio and proportion
   3. Equations
   4. Problem solving through equations
   5. Graphing

C. Geometry
   1. Measurement
   2. Similarity
   3. Congruence

D. Probability and Statistics

E. Business Mathematics
   1. Profit and loss
   2. Banking services
   3. Interest

MATHEMATICS 25

Recommended Text:

Saake, T. F. & B. Conchie, Mathematics of Consumer Studies.
Addison-Wesley, Don Mills, 1975.

Course Outline

The following topics should be considered as a suggested list only. Teachers should feel free to modify the program to suit the needs and interests of their students. Such modification may include the deletion and/or addition of some topics. Not all topics listed are treated in the recommended text.

A. Management of Personal Property
    1. Consumer credit
    2. Payroll and commissions
    3. Taxation
    4. Automobile
    5. Insurance
    6. Budgeting
    7. Stocks, bonds and investments
    8. Real estate

B. Application of mathematics principles* to
    1. Construction
    2. Sheet metal
    3. Electricity
    4. Food preparation
    5. Machine shop
    6. Agriculture

*Teachers should use their discretion in utilizing basic concepts of algebra, geometry, and trigonometry in presenting this unit.

Suggestions for Teachers of

Mathematics 15 and Mathematics 25

This section is divided into two general areas:
(a) General Suggestions
(b) Methodology

A. General Suggestions

1. Teachers of Mathematics 15 and Mathematics 25 should have an interest in the students and be aware of their past difficulties. The emphasis in these courses should be on individual student differences and needs, rather than course content.

2. Teachers should plan their program only after determining the interests, needs, and capabilities of their students.

3. Time allotments in the course outlines have been intentionally omitted to allow for maximum flexibility.

4. A basic premise of these courses is that students will participate actively in the learning process. An atmosphere conducive to student interests and relevant problem solving situations should be encouraged in these courses.

5. Each student should experience success. Success builds interest, motivates and reduces discipline problems. This does not imply that the work must be simple or of lowest common denominator for the students, but it does imply that development of mathematical concepts should be gradual, systematic, and meaningful.

B. Methodology

The success of this program depends to a great extent on the teacher's ability to use a variety of interesting methods in which students are actively involved. This is especially essential in the longer semester periods. The teacher is encouraged to plan lessons imaginatively. Some of the many resources, activities, and teaching techniques which may prove useful are listed below.

1. Resources:

(a) Use of local resources:
   - (i) Teachers may wish to draw on the human and physical resources of other subject areas within their schools.
   - (ii) Teachers may wish to obtain from local business and industrial concerns typical mathematical problems encountered in their daily routines.

(b) Use of material resources:
   - (i) Calculators, slide rules, and tables can be used as computational aids.
   - (ii) Audio-visual aids, such as films, film-strips, and overhead transparencies can create and maintain interest as well as aid in the understanding of concepts.
   - (iii) Skill kits and learning modules may help to meet individual differences among students.
   - (iv) Demonstration models often facilitate the understanding of mathematical concepts.
   - (v) Pamphlets and drill sheets may be useful in reinforcing some of the basic mathematical concepts.
   - (vi) Flow charts can be used to illustrate the basis of logical and sequential reasoning.

2. Activities

Some students learn better through activities which are closely related to relevant problems.

(i) Puzzles and games can be used to stimulate interest in mathematics.

(ii) Paper folding, curve stitching, etc., are often used to teach various geometric relationships.

(iii) Playing cards, dice, and marbles can be used to develop a basic understanding of probability and statistics.

(iv) Field trips can be used to stimulate an interest and understanding of mathematical concepts in their practical applications to various occupations.

REFERENCES

The following resources are recommended for the mathematics library. The books and materials listed are especially appropriate for the Mathematics 15 and Mathematics 25 courses.

Attridge, D. C. et al. General Mathematics (Book 2). Toronto: Ginn and Company, 1968.

Approaches basic mathematics by utilizing computational-aid techniques. The text has a few chapters on consumer-related topics.

Bernstein, A. L. and D. W. Wells. Trouble Shooting Mathematics Skills. Toronto: Holt, Rinehart and Winston, 1969.

This text gives an excellent review of basic mathematical operations and a brief introduction to consumer topics. It is most appropriate for the Mathematics 15 course.

Bye, M. P. and H. A. Elliott. Math Probe 2, 3, 4. Toronto: Holt, Rinehart and Winston of Canada, 1973.

These texts are designed for the more able student. However, there are excellent sections on business and consumer mathematics. (Canadian).

Jacobs, H. R. Mathematics, A Human Endeavour. San Francisco: W. H. Freeman and Company, 1970.

The textbook has a rather innovative approach to basic mathematics. A textbook for those who think they don't like the subject. It is appropriate for the Mathematics 15 course.

James, G. et al., Mathematics Dictionary. Scarborough: Van Nostrand Reinhold Company, 1968.

This is an excellent reference resource for all mathematical programs.

Jennings, W. H. and M. A. St. Louis. Mathematics for Business and Commerce. Toronto: Sir Isaac Pitman (Canada), 1966.

This text is appropriate as a supplement for the more able students in the Mathematics 25 course. The text deals with consumer and business related problems.

Johnson, D. A. et al. *Applications in Mathematics (Course A and B)*. Scott, Foresman and Company. 1972. (Canadian Distributor: Gage Publishing, Agincourt, Ontario).

The two texts are highly motivational and designed for the uninterested student, covering a variety of consumer topics and interesting applications.

Kravitz, W. W. and V. Brant. *Consumer Related Mathematics - A Business Approach*. Toronto: Holt, Rinehart and Winston, 1971.

This is an excellent reference for the Mathematics 15 course. It contains skill development and a variety of consumer related topics. There is a good geometry section with relevant application problems.

Lankford, F. G. and Wm. Goe. *Consumer Mathematics (Second Edition)*. Don Mills: Longman Canada, 1974.

Uses decision making as a basis of the program and gives a comprehensive treatment of consumer and business mathematics.

Lyng, M. J., L. J. Megoni and E. J. Zwick. *Career Mathematics, Industry and the Trades*. Houghton Mifflin Company, 1974. (Canadian Distributor: Thomas Nelson & Sons, Don Mills, Ontario.)

Technical and industrial problems are related to basic mathematical concepts. The text is an excellent supplement to the application section of the Mathematics 25 course.

Piper, E. B., J. Gruber and L. I. Milne. *Applied Business Mathematics (Canadian Edition)*. Agincourt: W. J. Gage, 1967.

A good source book for consumer topics.

Stein, E. I. *Fundamentals of Mathematics*. Toronto: Macmillan Company of Canada, 1971.

Includes arithmetic, algebra, informal geometry, graphs and statistics, a short chapter on consumer and technical mathematics with a reasonable amount of practice material on skills.

Special References

The following reference materials may be useful in creating interest in mathematics.

Alberta Education. Secondary School Reading Handbook. 1969. (Curriculum Branch).

Specific reference should be made to Chapter V "Reading in the Content Fields - Mathematics". This section deals with the skills required for reading in mathematics, suggested teaching techniques, student activities and resource material.

Brandes, L. G. Yes, Math Can be Fun. Portland: J. Weston Walch, 1960.

This pamphlet has some mathematical curiosities which may stimulate student interest in mathematics.

Clarke, Betty T. and Norman France. Spectrum Mathematics Series. (Blue Book and Purple Book). Laidlaw Brothers, 1973. (Canadian Distributor: Doubleday Publishers, Toronto.)

A good source of exercises to develop Mathematical Skills.

Cohen, Dian. You and Your Money
Put Time on Your Side
Planning Your Life Style
Value for Your Money
Your Stake in Tomorrow
Your Money is Their Business

The Royal Bank of Canada, Montreal, 1972.

This series of six booklets is useful for various topics in consumer mathematics.

Johnson, Donovan A. Excursions in Outdoor Measurement. Portland: J. Weston Walch, 1974.

Illustrates trigonometric relations very effectively.

Johnson, Donovan A. Paper Folding for the Mathematics Class. National Council of Teachers of Mathematics, Washington, D. C., 1970.

Illustrates geometric relationships.

Routledge, Joan Mathemetrics, 1, 2, 3, 4, 5. Agincourt: The Book Society of Canada, 1975.

This series of five pamphlets applies the metric system to several activity-oriented tasks in mathematics.

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